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Indium iron tin oxide: a cheap solution for ITO?Francis Boydens¹, Guido Huyberechts², Tom De Geyter², Diederik Depla³¹Ghent University, Gent, Belgium ²Flamac, a division of SIM vzw, Zwijnaarde, Belgium ³Research Group DRAFT, Ghent University, Gent, Belgium

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Indium tin oxide (ITO) is a solid solution of indium oxide (In_2O_3) and tin oxide (SnO_2). It is one of the most widely used transparent conducting oxides due to its excellent electrical and optical properties. The limited supply and high cost of indium however motivates the search for possible alternatives. One approach is to reduce the indium content by gradually substituting the In_2O_3 matrix with an isostructural oxide such as Fe_2O_3 .

In order to fast scan a wide range of different compositions, a technique is needed that offers both high flexibility as well as a good control over the film composition. This can be done using pressed powder targets in a DC magnetron setup, as the composition of the powder mixture can be easily varied[1].

In this work, we investigate the feasibility of depositing Fe-doped ITO thin films using this approach. The pressed powder targets contain different ratios of In, Sn and Fe powder in order to vary the composition of the films. These metallic targets are sputtered in reactive mode. The film composition is measured using energy-dispersive X-ray spectroscopy and is related to the target composition. X-ray diffraction measurements (Bragg-Brentano setup) are used to determine optimal deposition parameters. Changes in the crystallographic properties could be related to the change in film composition. The optical properties of the deposited films were studied using UV-VIS transmittance measurements and the electrical characterization was done by resistivity measurements. The influence of iron on the electrical and optical properties are investigated in respect to the cost decrease.

[1] Boydens, F. et al., Deposition of thin films by sputtering cold isostatically pressed powder targets: A case study, Phys. Status Solidi A, DOI 10.1002/pssa.201127490 (2011)

Keywords

ITO

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